New Species of *Commelina* (Commelinaceae) from East and South-central Africa

Robert B. Faden

Department of Botany, MRC 166, National Museum of Natural History, Smithsonian Institution, P.O. Box 37012, Washington, D.C. 20013-7012, U.S.A. fadenr@si.edu

ABSTRACT. *Commelina lukei* Faden (Commelinaceae) is newly described from southeastern Kenya, also distributed in northeastern Tanzania and Madagascar. It is distinguished from *C. kotschyi* Hasskarl by its larger, less undulate-margined leaves, larger spathes, and different distribution and ecology; from *C. imberbis* Ehrenberg ex Hasskarl and *C. mascarenica* C. B. Clarke by its capsule shape, appendaged seeds, and consistently clasping leaf bases; and from all three species by the presence of solely acicular hairs on the adaxial lamina midrib. *Commelina milne-redheadii* Faden is newly described from Zambia, also in Angola and Democratic Republic of the Congo. It differs from *C. scaposa* C. B. Clarke by the presence of leaves on the flowering shoots and larger spathes; from *C. hockii* De Wildeman by its narrower leaves and much smaller, striped spathes; from *C. welwitschii* C. B. Clarke by its tuberous roots, fewer-veined spathes, and several- to many-flowered upper cincinnus; and from all three species by its blue flowers and seeds with a dorsal ridge.

Key words: *Commelina*, Commelinaceae, hook-hairs, IUCN Red List, seed morphology, tropical East Africa.

Commelina L. is the largest genus of Commelinaceae worldwide and in Africa. The combined areas of the *Flora of Tropical East Africa* (Kenya, Uganda, and Tanzania) and *Flora Zambesiaca* (Malawi, Mozambique, Zambia, Zimbabwe, and Botswana) are especially rich in these species (Faden, 2001). In the course of writing family treatments for these floras, eight new species of *Commelina* have been described (Faden, 1994a, 2001, 2003; Faden & Alford, 2001). Two further species are described in this paper.

Adequate descriptions of new *Commelina* species should normally include floral, capsule, and seed morphology. The frequent lack of mature seeds and well-preserved flowers in specimens of *Commelina* has led to the provisional recognition but infrequent description of new African taxa by careful researchers, such as the late J. P. M. Brenan of Kew. Two such provisional species, recognized in the Kew Herbarium, have recently been described as *C. polhillii* Faden & Alford (Faden & Alford, 2001) and *C. kituloensis* Faden (Faden, 2001).

The two new species of *Commelina* described here were either completely overlooked or treated as odd specimens at Kew. *Commelina lukei* Faden was included within *C. imberbis* Ehrenberg ex Hasskarl, but new characters have been found that can be used in herbarium specimens to clearly separate these species. Specimens of *C. milne-redheadii* Faden included a collection that had been described as *C. welwitschii* C. B. Clarke var. *glabra* K. Schumann and other collections that were associated with *C. welwitschii* but not recognized as variety *glabra*. In the present study, it has been possible to recognize *C. milne-redheadii* as a distinct species because of the availability of complete material, including liquid-preserved flowers and mature capsules and seeds. Recently discovered, unnamed collections from Angola at the Natural History Museum (BM) have increased the known geographic range and morphological variation in this species.

1. Commelina lukei Faden, sp. nov. TYPE: Kenya. Kwale District: Kaya Kinondo, 4°23′S, 39°32′E, alt. 5 m, edge of lowland forest on coral rag, 17 Oct. 2000, *W. R. Q. Luke et al. 7080* (holotype, US3403791; isotypes, EA, K, MO not seen, US3403790). Figures 1, 2A–C, J, 3B.

Herba perennis (vel annua) usque ad 2.5 m longa; radices tenues fibrosae; surculi erecti vel ascendentes, demum trahentes vel effusi. Folia lamina sessili lineari-lanceolata usque oblongo-lanceolata vel lanceolata, 4–13 × (0.6–)1–3 cm, basi cordato-amplexicauli, pagina adaxiali costa trichomatibus acicularibus instructa. Spathae pedunculo (1.6–)2–4(–5.5) cm longo, solitariae, (1.4–)1.8–2.5 cm longae, (0.5–)0.7–1.2 cm altae, paginis pubescentibus, marginibus ad basem per 2–5 mm connatis; cincinnus superior ex spatha exsertus, flores masculinos 1 ad 3 efferens. Flores perfecti et staminati, petalis binatis plerumque azureis. Capsulae bi- vel triloculares, bivalves, 4- vel 5-seminales; semina in ambitu plus minusve subquadrangularia 3–3.6 × 1.75–2.2 mm, testa laevi, farinosa, hilo manifeste elevato, ad ambas extremitates in appendices extenso.

Perennial (or annual); roots thin, fibrous; shoots erect to ascending, becoming trailing or straggling, to

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Figure 1. *Commelina lukei* Faden. —A. Habit. —B. Spathe. —C. Male flower, front view. —D. Male flower, lateral view. —E. Bisexual flower, front view. —F. Bisexual flower, lateral view. All from cultivated material of *Luke et al. 7080.* Illustration by A. R. Tangerini.

2.5 m, rooting only near the base or decumbent; internodes to 14.5 cm, glabrous. Leaves mostly distichous, sometimes spirally arranged, sheaths 1–3 cm, sparsely pubescent with colorless hook-hairs, sometimes flushed or spotted with purple, eciliate at the apex, lamina sessile, linear-lanceolate to oblong-lanceolate or lanceolate, 4–13 × (0.6–)1–3 cm, apex acute to attenuate, base cordate-amplexicaul, margins

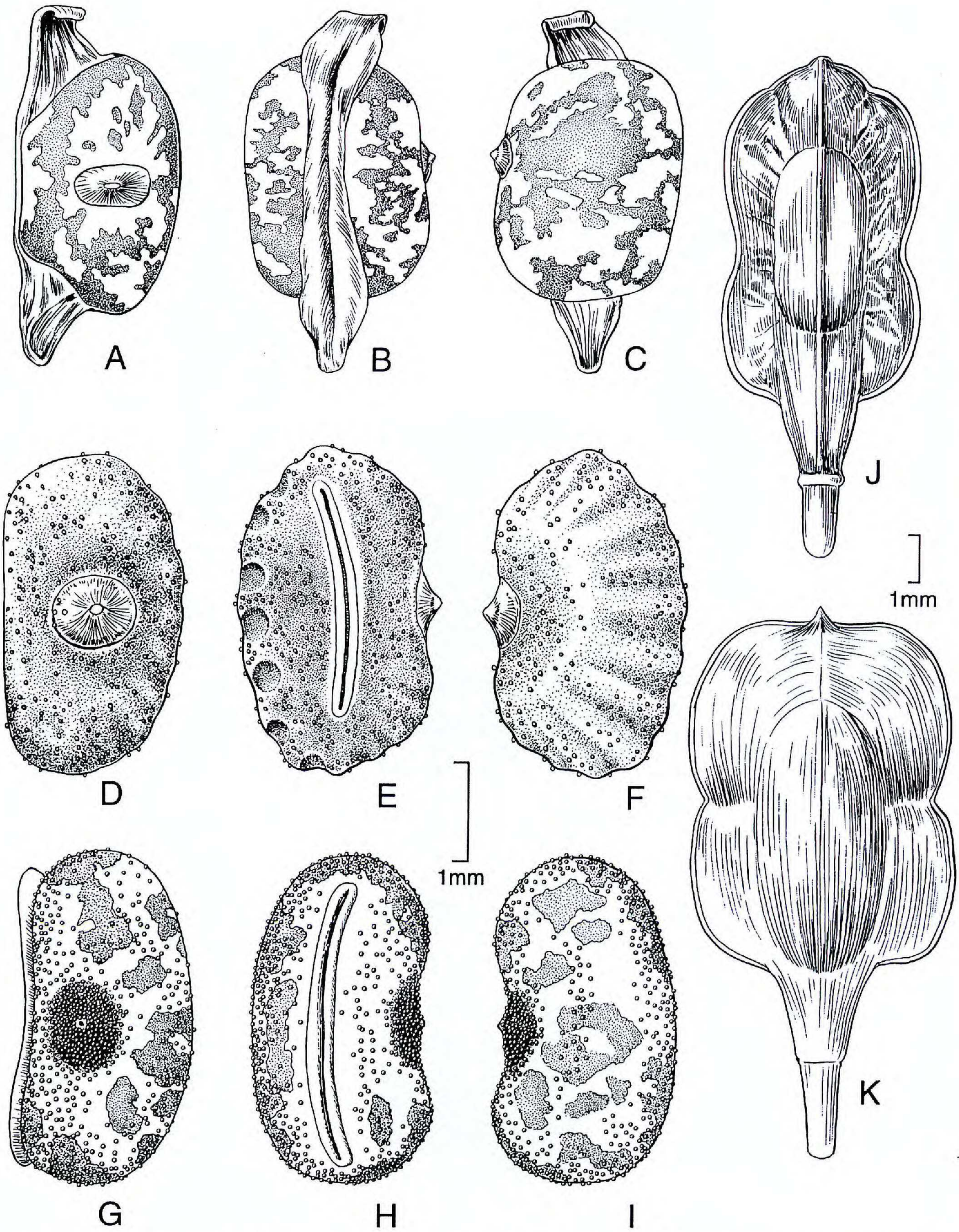

Figure 2. Capsules and seeds of *Commelina lukei* Faden, *C. imberbis* Ehrenberg ex Hasskarl, and *C. mascarenica* C. B. Clarke. A–C, J, *Commelina lukei*; D–F, K, *Commelina imberbis*; G–I, *Commelina mascarenica*. —A. *C. lukei*, ventral locule seed, lateral view. —B. *C. lukei*, ventral locule seed, ventral view. —C. *C. lukei*, ventral locule seed, dorsal view. —D. *C. imberbis*, ventral locule seed, lateral view. —E. *C. imberbis*, ventral locule seed, ventral view. —F. *C. imberbis*, ventral locule seed, dorsal view. —G. *C. mascarenica*, ventral locule seed, lateral view. —H. *C. mascarenica*, ventral locule seed, ventral view. —I. *C. mascarenica*, ventral locule seed, dorsal view. —J. *C. lukei*, capsule, dorsal view. —K. *C. imberbis*, capsule, dorsal view. A–C, J from field-collected material of *Luke et al. 7080* from Kenya; D–F, K from cultivated material of *Gillespie 4*, originally from Yemen; G–I from field-collected seeds of *Faden & Faden 77/362 bis* from Kenya (the herbarium specimens collected under *Faden & Faden 77/362* were *C. lukei*). Illustration by A. R. Tangerini.

scabrous, often slightly undulate, adaxial surface with a line of very fine, whitish, acicular hairs along the midrib, otherwise glabrous, abaxial surface sparsely pubescent with hook-hairs. Spathes solitary, peduncles (1.6–)2–4(–5.5) cm, puberulous with hook-hairs in a line or throughout, the hook-hairs of variable length; spathes (1.4–)1.8–2.5 × (0.5–)0.7–1.2 cm (folded), usually slightly to strongly falcate, sometimes just at the apex, apex acute (to acuminate), base cordate to truncate, margins shortly fused for 2–5 mm, ciliate along the fused edge, otherwise glabrous, surface pubescent with hook-hairs of 2 lengths, including some long, 3-celled hairs, green marginally, whitish with contrasting, dark green longitudinal veins toward the peduncle; upper cincinnus 1- to 3-flowered, flowers male, peduncle (1.4–)1.7–2.8 cm, long-exserted from the spathe, commonly arcuate post-anthesis, sparsely to densely puberulous with hook-hairs, sometimes of 2 sizes; lower cincinnus 5- to 7-flowered, the flowers mainly bisexual but sometimes male, peduncle 5–12 mm, glabrous or sparsely puberulous with minute hook-hairs; upper cincinnus with pedicels 4–6 mm, glabrous, lower cincinnus with pedicels 3.5–7 mm, glabrous. Flowers bisexual and sometimes male, (13–)15–21 mm wide; sepals free, hyaline green with colorless or blue-tinged margins, upper sepal lanceolate-oblong to ovate-elliptic, 2.5–4.5 × 1.2–1.5 mm, lower sepals ovate-elliptic to obovate-elliptic, 3.5–5 × 2.2–3.2 mm; paired petals (9–)12.5–16 × (6–)10–13 mm, limb broadly ovate to ovate-reniform, (5.5–)8.5–10 × (6–)10–13 mm, blue, sometimes pale blue, rarely pale rosy lilac, apex rounded to truncate or emarginate, base cordate, claw 5–6 mm, concolorous with the limb or paler, lower petal ovate to ovate-elliptic, (3.5–)4.5–7 × 2.5–5 mm, concolorous with or slightly paler than the paired petals; staminodes 3, subequal, filaments (3–)4–5 mm, blue, rarely pale rosy lilac, tipped with white or yellow, antherodes 6-lobed, 1.2–1.6 mm, yellow with tiny orange pollen sacs; lateral stamen filaments parallel basally, then divergent, then convergent distally, sometimes crossing near the apex, question mark–shaped, geniculate distal to the middle, (7.5–)11–16 mm, blue, tinged with lavender, rarely pale rosy lilac, anthers elliptic to oblong-elliptic or lanceolate-elliptic, (1.2–)1.5–2 mm, blue, violet, or blue and white, pollen white; medial stamen filament straight or arcuate-decurved, recurved at the apex, (5–)5.5–8 mm, blue, rarely pale rosy lilac, anther held near the lateral anthers, saddle-shaped, strongly curved, (2–)2.5–3.5 × 0.6–1 mm, usually blue or bluish green and yellow, with yellowish basal lobes, with 2 dark blue longitudinal lines above, pollen dull yellow; ovary oblong-ellipsoid, ca. 2 mm, 5-ovulate, style exceeding or equaling the stamens, ± sigmoid, curving laterally out of the floral midplane, strongly recurved apically, (8–)9–13 mm, entirely blue or white shading to blue distally, stigma deltate, slightly enlarged, dark blue. Capsules bi- to trilocular, bivalved, 4- to 5-seeded, oblong, (7.5–)8–9.5 × (3.6–)4–5.5 mm, constricted between the seeds, with a truncate or rounded, sometimes shortly apiculate, obdeltate apical extension, gray-green to brown, dorsal locule 1-seeded or not developed, ventral locules 2-seeded; seeds ± quadrangular in outline, ± concave at the base and apex, 3–3.6 × 1.75–2.2 mm, testa smooth, predominantly dark brown or mottled various shades of brown, white- to tan-farinose, hilum with prominent, whitish to tan papery wings that extend apically and basally into concolorous appendages, embryotega lateral, relatively inconspicuous, without a prominent apicule.

Chromosome number. There is a count of $n = 15$ from *Lewis 6062* (Lewis, 1964, as *Commelina imberbis*). I have obtained $2n = 30$ from *Taita Hills Expedition T747* (cultivated at Smithsonian Institution, cytological voucher slides: *85/106*, *85/123*, *85/124*) and from *Luke et al. 7080* (grown from seed of the type collection at the Smithsonian Institution, with voucher pressed as *R. B. Faden 2002/012*, cytological voucher slide: *05/02*) (Faden, unpublished).

Habitat. The new species has been collected from lowland evergreen forest, forest edges and clearings, open areas in montane forest, plantations, thickets, bushland, grassland, woodland, roadsides, sometimes associated with rocks in moist situations, riversides; sea level to 1000(–1700) m.

Phenology. Flowering specimens have been seen from all months.

Distribution. Southeastern Kenya, northeastern and south-central Tanzania, including Zanzibar (K7; T3, 6, 7, Z of *Flora of Tropical East Africa* [Polhill, 1988]), and Madagascar.

IUCN Red List category. *Commelina lukei* can be considered as Least Concern (LC) according to IUCN Red List criteria (IUCN, 2001). Although this species occurs in densely populated coastal areas of Kenya and Tanzania, it also occurs somewhat farther inland in more sparsely populated habitats, so it is likely not to be endangered or vulnerable. The single collection from Madagascar leaves its status there unknown.

Etymology. The new species is named in honor of William Richard Quentin Luke, whose collections, many made with Ann Robertson, have greatly increased our knowledge of the flora of tropical East Africa, especially Kenya, and whose specific collections of this species, at my request, have enabled it to

be illustrated from living material and have permitted the completion of its description.

Discussion. *Commelina lukei* is most distinctive because of its often scrambling habit, the leaf bases all amplexicaul, the adaxial leaf midrib with only acicular hairs, the stamen filaments question mark–shaped (when viewed laterally), the capsule with a rounded to truncate apical extension, and the seeds smooth with a raised hilum that is extended as appendages at both ends (Figs. 1–3). It is probably most closely related to *C. kotschyi* Hasskarl, which has similar, appendaged seeds in capsules with a similar apex. *Commelina kotschyi* differs by its distinctly annual habit, mainly smaller leaves with strongly undulate margins, the presence of only or mostly hook-hairs along the adaxial leaf midrib, smaller spathes, the absence of the upper cincinnus, and its occurrence at generally higher elevations, farther inland, and mainly or strictly in seasonally waterlogged soils.

Commelina kotschyi has largely been misinterpreted or unrecognized in the floras in which it occurs, which has compounded the problem of recognizing *C. lukei* and its affinities. For example, in the treatment of the Commelinaceae in *Flora of Southern Africa* (Obermeyer & Faden, 1985), *C. kotschyi* was treated as *C. imberbis*, but the latter does not occur in southern Africa. In both editions of *Upland Kenya Wild Flowers*, *C. kotschyi* was omitted, and the few collections of this species from the flora area were treated as *C. imberbis* (Faden, 1974, 1994b). *Commelina kotschyi* ranges from Ethiopia to South Africa and Angola and is also in India. In the only countries in which both *C. lukei* and *C. kotschyi* occur, Kenya and Tanzania, the species are allopatric, with *C. lukei* occurring mainly along the coast and extending only as far inland as the Taita Hills in Kenya and the Pare District in Tanzania and *C. kotschyi* occurring only farther inland. The two species overlap in elevation in these countries mainly because of high elevation collections of *C. lukei* from the Taita Hills (Kenya) and Western Usambara Mountains (Tanzania).

In the field and in the herbarium *Commelina lukei* has been confused mainly with *C. imberbis*, with which it is allopatric, and with *C. mascarenica* C. B. Clarke, with which it is sympatric. Both *C. imberbis* and *C. mascarenica* have more or less oblong capsules and ellipsoid seeds (Fig. 2D–I, K), and all collections with similar capsules and seeds, including specimens of *C. lukei* and *C. kotschyi*, were usually identified as "*C. imberbis*." All of these species also have leaves with bases clasping the stem (at least in the most distal leaves on the flowering shoots), solitary spathes with the margins shortly fused at the base, the hairs on the spathes relatively short, and blue flowers, so it is not surprising that the species were not well understood.

Commelina imberbis and *C. mascarenica* differ from *C. lukei* by usually having only the upper leaves amplexicaul (except in some populations of *C. imberbis*) (vs. all the leaves amplexicaul), the adaxial leaf midrib with solely or mostly hook-hairs (vs. only acicular hairs) (Fig. 3), the capsule with the apex truncate or emarginate (vs. with a rounded to truncate apical extension) (Fig. 2J, K), and the seeds not appendaged (vs. appendaged) (Fig. 2D–I). In addition, the lateral stamen filaments in both these species are less strongly curved and not question mark–shaped, as in *C. lukei*. In most populations of *C. imberbis* from Kenya and Tanzania, the spathes lack an upper cincinnus, in contrast to *C. mascarenica* and *C. lukei*. *Commelina imberbis* and *C. mascarenica* can further be distinguished from each other by their capsules and seeds, with the capsules of *C. imberbis* shorter and proportionally broader (7.3–8 × 4.5–5.8 mm vs. 8.3–10 × (3.6–)4.7–6 mm) (Fig. 2K) and the seeds dark brown, rugose, and often weakly radially ridged, with a shorter hilum (vs. dark brown or gray and mottled with lighter brown or gray, smooth, not ridged, with a longer hilum) (Fig. 2D–I).

Commelina lukei bears a striking vegetative resemblance to some plants of *C. latifolia* Hochstetter ex A. Richard, because they both have all of their leaves amplexicaul at the base and the adaxial midrib with only acicular hairs. The two species only occur close to one another in the Taita Hills, Kenya, and Western Usambara Mountains, Tanzania. In those mountains *C. lukei* is at its farthest inland extent and highest elevations. It occurs in natural habitats. In contrast, the inland species *C. latifolia* is at its nearest occurrence to the coast and it is found only in disturbed situations. It may be an introduced weed in these mountains. *Commelina latifolia* can be distinguished from *C. lukei* by lacking an upper cincinnus, its flowers having less strongly curved lateral stamen filaments, its white (vs. blue) medial petal, and its quadrate (vs. oblong) capsules with spherical, dark brown seeds that lack appendages.

The distinctive shape of the capsule apex in *Commelina lukei*, which can be recognized even when the capsule is not fully mature, is related to the shape of the seeds. The appendages of the hilum, which I expect function as elaiosomes for seed dispersal by ants, as has been observed in *C. erecta* L. (Faden, unpublished), necessitate the extension of the capsule apex from the normal, emarginate shape found in species such as *C. imberbis* and *C. mascarenica*. In specimens of *C. lukei* with less prominently appendaged seeds, the capsules have correspondingly less pronounced apical extensions and are less markedly different from those of *C. imberbis* and *C. mascarenica*.

In all three populations of *Commelina lukei* in which flowers have been photographed (*Faden, Evans & Rathbun 69/402*, *Faden & Faden 74/513*, and *Luke et al. 7080*), it has been observed that the lateral stamen filaments of the male flower in the upper cincinnus are distinctly longer than the homologous filaments of the bisexual flower in the lower cincinnus of the same spathe. Thus, it appears that stamen filament dimorphism is likely the norm in this species. This has not been noted previously in *Commelina*, although it is not uncommon is some species of *Aneilema* R. Brown (Faden, 1991, 2000).

A brief history of the discovery and final recognition of *Commelina lukei* is instructive because it shows how some species of *Commelina* that may be easy to recognize in the field can be problematic and difficult to distinguish from dried specimens. I first collected *C. lukei* in 1969 and considered it then to be distinct from *C. imberbis* because of its unusual stamen filament curvature and the presence of an upper cincinnus in the spathe. The presence of smooth seeds in some herbarium specimens from the coast seemed to further distinguish the new species from *C. imberbis*. However, until recently I could not consistently distinguish herbarium specimens of these species.

A breakthrough occurred as a result of a careful study of herbarium specimens at the Royal Botanic Gardens, Kew. During the course of this investigation, I discovered that there were, surprisingly, two similar species along the East African coast, *Commelina lukei*, with smooth, appendaged seeds (Fig. 2A–C), and a species with smooth seeds that lacked appendages and was much more like *C. imberbis*, except for the presence of a well-developed upper cincinnus (Fig. 2G–I). The latter species I had known only from southwestern Kenya, where it was called "*Commelina* sp. D" in Faden (1974, 1994b), and from Somalia, where it was treated as "*Commelina* sp. 5" in Faden (1995). A separate study of this species (Faden, 2008) demonstrated that it was *C. mascarenica*, a species from Madagascar and the Comoro Islands, but not previously recorded from mainland Africa. A brief note on *C. mascarenica* in Somalia is in Faden (2006).

The difficulty was to find characters that could distinguish all herbarium specimens of *Commelina lukei* and *C. mascarenica*, the two coastal species, which were seldom collected with capsules and seeds. Looking for any character that might be useful, I eventually noted that some specimens had only short, needle-shaped, acicular hairs along the adaxial leaf midrib, whereas other collections had mainly or exclusively, smaller hook-hairs on the midrib (Fig. 3). When I separated the specimens into two piles, based on this pubescence character, I discovered that all the specimens with only acicular hairs had all of the leaf bases clasping the stems, whereas the specimens with all or mostly hook-hairs on the midrib had only the distal leaves on the flowering shoots with clasping bases, the remaining leaves having rounded to cuneate bases. When the specimens with capsules and seeds were checked, it was found that they also separated perfectly on the basis of adaxial leaf midrib pubescence and clasping leaf bases. Thus, all specimens of these two species, regardless of the presence or absence of capsules and seeds, could be identified with certainty. The species with acicular leaf midrib hairs and consistently clasping leaf bases was *C. lukei*. The other species was *C. mascarenica*.

These two coastal species can occur together, which adds to the confusion. For example, *Faden & Faden 77/362* was not recognized as a mixed collection for many years. The dried specimens proved to be *Commelina lukei*, but the separately collected seeds and the plants subsequently grown therefrom, since renumbered *77/362 bis*, belonged to *C. mascarenica*.

The distribution of *Commelina lukei* only in mainland Africa and Madagascar is known in other Commelinaceae such as *C. mascarenica*, *Cyanotis speciosa* (L. f.) Hasskarl, and *Floscopa glomerata* (Willdenow ex Schultes f.) Hasskarl. Other species may also show this pattern, but they have not yet been fully investigated.

Paratypes. KENYA. **Kilifi:** Watamu, Plot 48, *D.O.G. 33* (EA); Mida, *R. M. Graham 1999* (EA, K); Watamu Peninsula, Mida Creek, *P. Kuchar 9967* (EA); Vipingo, 20 mi. N of Mombasa, *B. Verdcourt 1056S* [mixed collection with *Commelina mascarenica*] (K). **Kwale:** Diani, 15 mi. S of Mombasa, *A. D. Q. Agnew 9738* (EA); just before Shimoni, 4°38′S, 37°23′E, *R. B. Faden & A. J. Faden 77/362* [mixed collection with *C. mascarenica* (*77/362 bis*)] (EA, K, US); Kwale, *R. M. Graham 2038* (EA, K); < 1 km inland from Tiwi Beach, on N-S dirt rd. in area of Maweni Cottages, *P. Kuchar 7230* (EA); Nairobi–Mombasa hwy., ca. 8 km E from Mackinnon Station, *P. Kuchar 7336* (EA); Shimba Hills, Longo Magandi area, *F. Magogo & P. Glover 162* (EA); Shimba Hills, Tanga rd. near Marere Pumping Station, *F. Magogo & P. Glover 677* (EA, K); Shimba Hills, Tanga rd. near Marere Waterworks, *F. Magogo & P. Glover 904* (EA); Ras Kikadini, *S. A. Robertson 7377* (US); Maluganji Forest Reserve (including Kaya Mtae), W boundary, 4°06′S, 39°27′E, *S. A. Robertson & Q. Luke 6056* (EA); Rabai Hills, Mombaz [Mombasa], July–Sep. 1885, *W. E. Taylor s.n.* (BM); Mrima Hill, *B. Verdcourt 1851S* (BR, K). **Mombasa:** Bamburi, Coraldene Beach Hotel, *F. Ng'weno 95* (EA). **Teita:** Maungu Station to Rukanga, ca. 1 mi. S of Mombasa–Nairobi rd., 3°35′S, 38°44′E, *R. B. Faden 70/149* (EA, K); Taita Hills, Chawia Forest, Bura Bluff, 3°29′S, 38°21′E, *R. B. Faden, A. Evans & P. E. Glover in R. B. Faden 70/454* (EA, US); Taita Hills, Mbololo Hill (Mraru Ridge), rd. from Msau, stream crossing 0.5 km from Mwambirwa Forest Station (toward Msau), *R. B. Faden, A. Evans & M. Githui 71/212* (EA, US); Maungu Station–Rukanga rd., 2–3 mi. from Maungu Station, *R. B. Faden, A. Evans & G. Rathbun 69/402* (EA, K); Mt. Kasigau, lower slopes above Rukanga, *R. B. Faden, A. Evans & G. Rathbun 69/412* (EA, K); Voi–Taveta

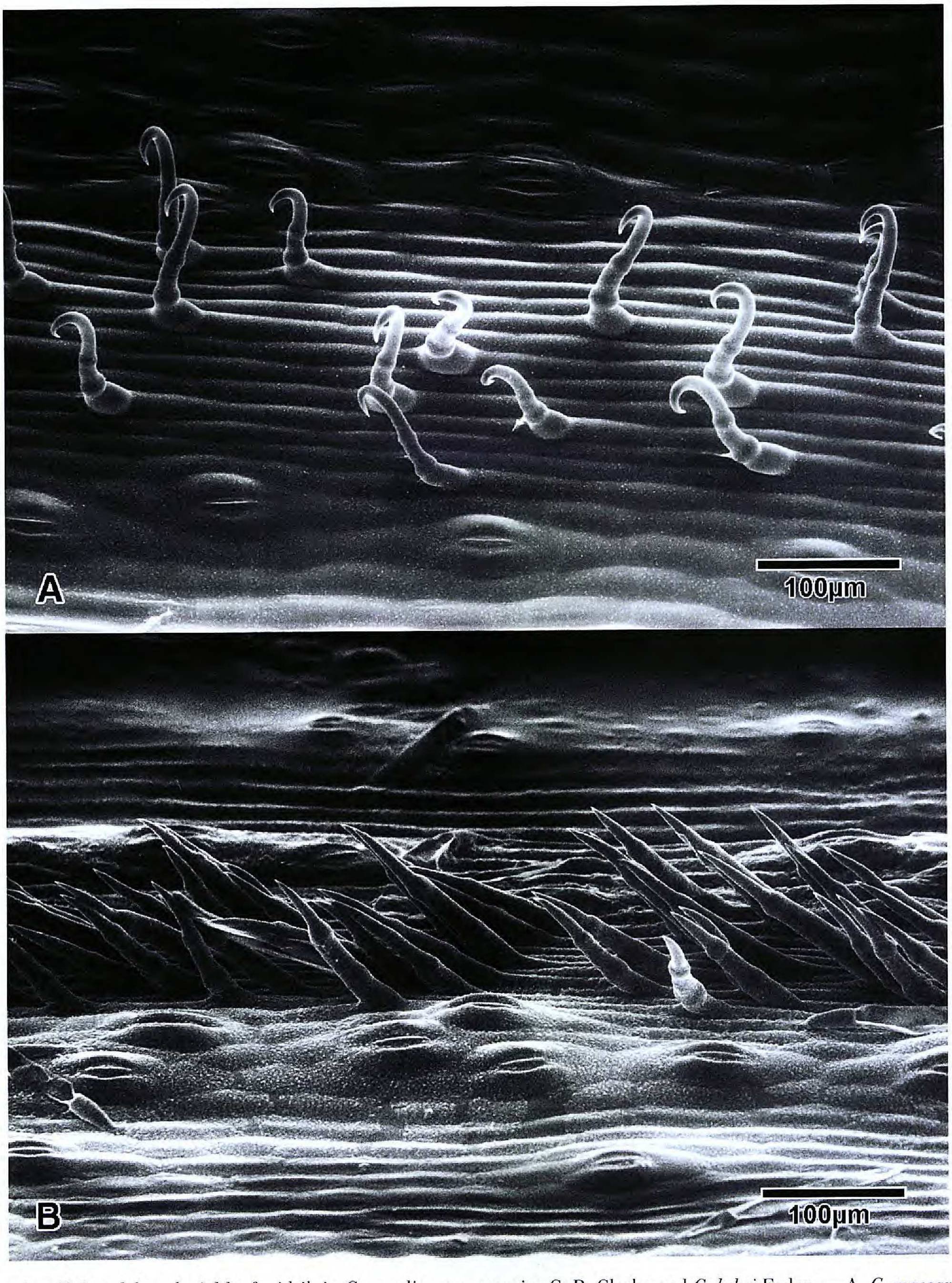

Figure 3. Hairs of the adaxial leaf midrib in *Commelina mascarenica* C. B. Clarke and *C. lukei* Faden. —A. *C. mascarenica*, showing 3-celled hook-hairs (from cultivated material grown from the seed collection of *Faden & Faden 77/362 bis*, originally from Kenya). —B. *C. lukei*, showing acicular hairs (from cultivated material of *Luke et al. 7080*, originally from Kenya). SEM images taken with Philips XL30 ESEM (Eindhoven, The Netherlands) using fresh, uncoated leaves.

rd., 28 km toward Taveta from turnoff on Nairobi–Mombasa rd., 3°30′S, 38°19′E, *R. B. Faden & A. J. Faden 74/513* (EA, K); Taita Hills, Mlashu Village, 3°20′S, 38°24′E, *G. Mwachala et al. in EW3255* (EA); Voi, *E. R. Napier* 913 (EA, K); Taita Hills, Ngangao Forest, 3°22′S, 38°20′E, *Taita Hills Expedition T747* (EA); Sagala Hill, 3°30′S, 38°36′E, *Taita Hills Expedition T1066* (EA). **District Unknown:** "British East Africa," s. loc., *C. F. Elliott 236A (336A?)* (K); "K7," *F. Ng'weno in EA15479* (EA). MADAGASCAR. **Province Uncertain:** "Boïna" (fide Perrier de la Bâthie, 1938), *W. Bojer s.n.* [specimen marked "B"] (P). TANZANIA. **Handeni:** Kideleko, *A. E. Archbold 566* (K). **Lushoto:** West Usambaras, Mkusu Valley betw. Mkuzi & Kifungilo, *R. B. Drummond & J. H. Hemsley 2198* (BR, EA, K); Amani rd. to Derema, *C. H. S. Kabuye 188* (EA); Amani, top of Bomole, *S. A. Renvoize & R. A. Abdallah 1641* (K); Amani, *R. Soleman*

7481, *7482* (EA, K); Amani, Derema, *B. Verdcourt 155* (BR, EA, K); Amani, *A. Zimmermann 87*, *8233* (EA). **Njombe:** Lupembe, upper Ruhudje [= Ruhudji] [River], *Schlieben 1057* (B). **Pangani:** Bushiri, *H. G. Faulkner in Kew 629* (BR, K). **Pare:** Kiruru, *A. E. Haarer 1443* (EA, K). **Tanga:** coast near Bomandani, 8 mi. S of Moa, near sea, *R. B. Drummond & J. H. Hemsley 3699* (BR, EA, K); Amboni, *W. Geilinger 154* (K); Kange Estate, *H. Faulkner 876* (K); Sawa, *H. Faulkner 4081A* (K); Tanga area, 6.3 mi. W of Tanga, *W. H. Lewis 6062* (K, US); 11 km from Tanga off Korogwe rd., *R. M. Osborn 102* (EA, K). **Uzaramo:** Oyster Bay, *M. Batty 70* (K). **Zanzibar:** s. loc., *W. Bojer s.n.* (K); s. loc., Oct. 1873, *J. M. Hildebrandt 1054* (BM); near Pete, ca. 6°16′S, 39°24′E, *R. J. Robins 32B* (EA); Chwaka, *J. H. Vaughan 1745* (EA, K). COUNTRY UNCERTAIN. Pemba, Zanzibar & Mombas islands, *W. Bojer s.n.* (TCD).

2. Commelina milne-redheadii Faden, sp. nov. TYPE: Zambia. Mwinilunga District: Kalenda Plain, damp ground near exposed "laterite" by Water Hole, 18 Oct. 1937, *E. Milne-Redhead 2824* (holotype, K [sheet 2 of 2]; isotypes, BM, BR, K [sheet 1 of 2]). Figure 4.

Commelina welwitschii C. B. Clarke var. *glabra* K. Schumann in Kunene-Sambesi-Exped., 183. 1903. TYPE: Angola. Nambali, 7 Oct. 1899, *H. Baum 256* (holotype, B not seen; isotypes, BM, K).

Herba perennis; radices tuberosae anguste fusiformes; surculi erecti vel ascendentes, (10–)15–48 cm longi. Folia pro parte maxima basalia vel interdum caulina, lamina lineari vel in aliquibus foliis distalibus caulinis lanceolata, (1.5–)3–16.5 cm longa, basi 3–6(–9) mm lata, in medio 1.5–3 mm lata. Spathae solitariae, (1.5–)1.6–3.1 cm longae, (0.5–)0.7–1.1 cm altae, marginibus haud connatis, ciliatis, paginis plerumque glabris, purpureofasciatis secus venas; cincinnus superior (1 vel)2 ad 10 flores efferens, pedunculo ex spatha longe-exserto. Flores caerulei, petalo inferiore ovato vel ovato-lanceolato, albo vel ut videtur pallide lilacino. Capsulae triloculares, bivalves, usque ad 5-seminales; semina valde dimorpha, semine loculi dorsalis 3.15–3.5 × ca. 1.85 mm, fere laevi, crista mediodorsali nulla, semina loculorum ventralium (2–)2.4–2.85 × 1.5–1.6 mm, crista mediodorsali valde prominenti, testa subtiliter et irregulariter reticulata.

Perennial geophytic herb; roots tuberous, tufted on a short, thick caudex, uniformly thick, then tapered distally, or narrowly fusiform, to 4 mm thick; shoots tufted or apparently solitary, erect to ascending, or decumbent basally, unbranched to sparsely branched, up to 4-noded, not rooting at the nodes, (10–)15–48 cm, bases to 10 mm thick, covered by bladeless or nearly bladeless sheaths; internodes to 25 cm, glabrous or with a line of pubescence below the node. Leaves mostly basal on short sterile shoots or predominantly cauline (in some detached shoots), basal sheaths to 3.3 cm, the distal ones 1–3.5 cm, surface glabrous, or solely with a line of uniseriate hairs along the fused edge, or sparsely pubescent all over with short uniseriate hairs, ciliate at the apex, lamina sessile, conduplicate to rolled up (longitudinally), linear (to lanceolate in some reduced distal cauline leaves), (1.5–)3–16.5 cm, 3–6(–9) mm wide at the base, 1.5–3 mm wide in the middle, base broadened into the sheath, apex acute to acuminate, margins ciliate, at least basally, not scabrid or rarely scabrid apically, surfaces glabrous, veins sometimes prominently raised abaxially. Spathes solitary, peduncles (1.5–)2.7–10(–20) cm, glabrous to densely puberulous, the pubescence sometimes including hook-hairs, spathes not at all to slightly falcate, (1.5–)1.6–3.1 × (0.5–)0.7–1.1 cm (folded), base rounded to cordate, apex acute to acuminate, margins free, glabrous or ciliate at least in basal half, surfaces usually strongly striped with purple along the veins, usually glabrous, occasionally hirsute with uniseriate hairs; upper cincinnus (1 to)2- to 10-flowered, producing male and bisexual flowers, peduncle long-exserted, 11–28 mm, glabrous to densely puberulous with hook-hairs, lower cincinnus 7- to 15-flowered, producing bisexual and male flowers, peduncle 7–10 mm, sparsely to densely puberulous with hook-hairs. Flowers bisexual and male; pedicels glabrous to sparsely puberulous with hook-hairs, 3.5–8 mm in the upper cincinnus, 2.5–6 mm in the lower cincinnus; upper sepal lanceolate-elliptic, 3–5.5 × ca. 2 mm, lateral sepals free, ovate to ovate-elliptic or obovate-elliptic, 3.5–6.5 × 2.5–3 mm, outer margins apparently hyaline lilac; paired petals ca. 7.5–8 × ca. 5.5–6 mm, blue (bright blue fide *Milne-Redhead 2824*), limb broadly ovate, ca. 4–4.5 × ca. 5.5–6 mm, claw ca. 3–4 mm, lower petal ovate to lanceolate-ovate, 3–7.5 × 2–5 mm, white (fide *Milne-Redhead 2824*) or apparently pale lilac or light blue (in dried specimens), apex acuminate, margin sometimes erose basally; staminodes 3, subequal, filaments 3–6 mm, antherodes 6-lobed, ca. 0.7–2 mm, the medial lobes (pollen sacs) relatively large, apparently entirely yellow ("orange" fide *Milne-Redhead 2824*); lateral stamen filaments ca. 6–9 mm, anthers (1.3–)1.8–2.5 mm, with blackish pollen sacs, medial stamen filament ca. 4.5–7 mm, anther saddle-shaped, the apex sometimes recurved, ca. 1.4–3 mm, lacking sterile basal lobes, apparently entirely yellow; ovary ca. 1.2–2 mm, style ca. 8–12 mm, stigma slightly enlarged. Capsules trilocular, bivalved, up to 5-seeded, oblong-ellipsoid, (2.25–)5–6.5 × (1.3–)2–3 mm, shortly apiculate, greenish tan to stramineous, dorsal capsule valve commonly deciduous, the ventral valve then strongly recurved, the deciduous valve commonly with the apex and sometimes also the base bifurcated, commonly strongly wrinkled, especially over the seed, dorsal locule 1-seeded, indehiscent, ventral locules 1- to 2-seeded, dehiscent; seeds strongly dimorphic; dorsal locule seed adherent to the capsule wall, strongly dorsiventrally compressed,

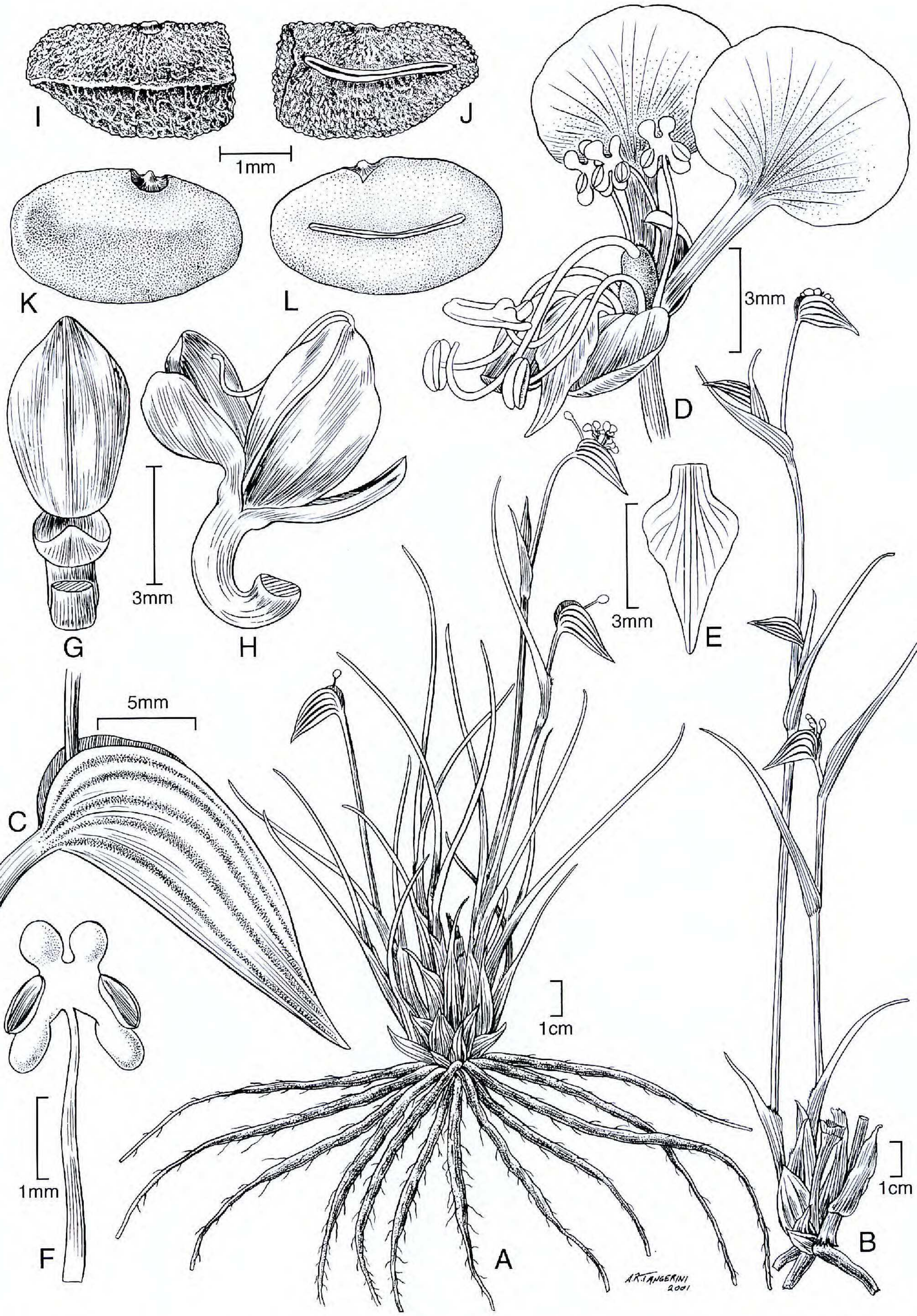

Figure 4. *Commelina milne-redheadii* Faden. —A. Habit. —B. Flowering shoot. —C. Spathe. —D. Bisexual flower, front/lateral view. —E. Lower petal. —F. Staminode. —G. Immature fruit, dorsal view. —H. Immature fruit, lateral view. —I. Ventral locule seed, dorsal view. —J. Ventral locule seed, ventral view. —K. Dorsal locule seed, dorsal view. —L. Dorsal locule seed, ventral view. All from *Milne-Redhead 2824* (K): A, C & I–L from sheet 2 of 2; B from sheet 1 of 2; D–H from *Kew Spirit Collection 38421*. Illustration by A. R. Tangerini.

ellipsoid, mounded middorsally, rounded or truncate at one end and acute or rounded at the other end (the ends dissimilar), 3.15–3.5 × ca. 1.85 mm, testa grayish pink or pale orange-brown, smooth or with a few short, shallow, irregular, dorsal furrows; ventral locule seeds strongly dorsiventrally compressed, broadly ovate to deltate, with a strongly raised middorsal ridge running the length of the seed, (2–)2.4–2.85 × 1.5–1.6 mm, testa dark brown, finely and irregularly reticulate on all surfaces, the reticulum composed of lines of slightly paler, bead-like cells in rows, not farinose; embryotega lateral, almost completely covered by beaded cells so as to obscure its demarcation from the testa, with a small, low, blunt, central projection; hilum raised and slightly sigmoid, ca. 3/4 the length of the seed.

Chromosome number. Unknown.

Habitat. The new species has been collected from moist to marshy places, apparently in grassland, sometimes associated with laterite, also in dry forest.

Phenology. Flowering September to November, and February.

Distribution. Angola to northwestern Zambia, and southern Democratic Republic of the Congo.

IUCN Red List category. *Commelina milne-redheadii* can be considered as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001). This species may be genuinely uncommon to rare, at least in Democratic Republic of the Congo and Zambia, from which single collections are known, but *Commelina* species tend to be undercollected, and the specimens of *C. milne-redheadii* come from a wide area. From what is recorded about the habitat of this species, there is nothing that would account for its apparent scarcity other than undercollecting.

Etymology. This species is named in honor of Edgar Wolston Bertram Handsley Milne-Redhead, not merely because he collected the type, but also because he more carefully documented Commelinaceae flowers than almost any other 20th-century botanist through his excellent collections, including spirit material of flowers, and detailed descriptive notes on the labels. Moreover, he inspired other botanists, such as Peter Taylor and Roger M. Polhill, to do the same. I have retained the hyphen in the species name because it links two words, in this case surnames that usually stand independently, according to Article 60.9 of the *International Code of Botanical Nomenclature* (McNeil et al., 2006).

Discussion. Sheet 2 of 2 at Kew of *Milne-Redhead 2824* has been selected as the holotype because it contains mature seeds in the packet on the sheet, although the young spathes on this sheet could not have been the source of the seeds.

Commelina welwitschii var. *glabra* was distinguished from the typical form of that species by its blue flowers. It clearly belongs to *C. milne-redheadii*. Even if it were desirable, the variety cannot be raised to species rank as *C. glabra* because *C. glabra* C. B. Clarke, a species from India, precludes it. Although a replacement name could have been selected, that was rejected because it would have retained the new species based on Schumann's concept of it as merely a blue-flowered plant similar to *C. welwitschii*. I consider *C. milne-redheadii* to be quite distinct morphologically from *C. welwitschii* (see below), its flower color being only one of a suite of differences.

Commelina milne-redheadii is distinctive because of its geophytic habit, short, cauline leaves, free-margined spathes, sky-blue flowers, frequent presence of hook-hairs on the pedicels (at least in the lower cincinnus), and strongly keeled ventral locule seeds (but see below). It can be confused with *C. scaposa* C. B. Clarke because of its often short cauline leaves, long-pedunculate spathes with free margins, and a multiflowered upper cincinnus. It differs most clearly by the regular presence of leaves on the flowering shoots, larger spathes, and blue flowers. The almost never collected leaves of *C. scaposa*, to the extent that they are known, are much broader than those of *C. milne-redheadii* and are apparently produced on separate shoots after the precocious, more or less leafless flowering shoots arise.

Among other geophytes with free-margined spathes, *Commelina milne-redheadii* also shows some resemblance to *C. hockii* De Wildeman and *C. welwitschii*. It differs from the former by its narrower leaves, much smaller, purple-striped spathes, blue (vs. white to pink) flowers, and smaller capsules; and from the latter by its tuberous roots (vs. a beaded rhizome), fewer-veined spathes, usually several- to many-flowered (vs. 1-flowered) upper cincinnus, blue (vs. yellow) flowers, and smaller, trilocular capsules.

Sheet 2 of *Milne-Redhead 2824* (K), the only specimen of this species with a complete base and root system, shows most of the foliage on short, apparently sterile, basal shoots (Fig. 4A). It is not certain whether these are just young flowering shoots that have yet to elongate or they are strictly vegetative shoots. Based on its small flowering shoots, in comparison with other specimens, this plant appears to have only recently started flowering, so possibly the sterile basal rosettes could have produced flowering shoots too. Sterile rosettes are present at the bases of some, but not all, shoots in other collections of this species. Although such basal shoots might character-

ize this species, as they do *Aneilema pomeridianum* Brenan and *Cyanotis longifolia* Bentham, they would not necessarily be present in specimens consisting only of detached flowering shoots. Thus, our understanding of the habit of *C. milne-redheadii* is incomplete.

The strongly dimorphic seeds seem to be very distinctive. However, the seeds of *Commelina hockii* and *C. scaposa* are incompletely known, so they, too, could possibly show such a dimorphism. The very strong middorsal keel on the ventral locule seeds has not been seen elsewhere in *Commelina*. Among the species that have been studied, only *C. scandens* Welwitsch ex C. B. Clarke has a middorsal ridge, but it is not nearly as pronounced as in *C. milne-redheadii*. The only other collection seen of *C. milne-redheadii* with nearly mature seeds, besides the type, is *Gossweiler s.n.* (BM 71280). These seeds do not show a middorsal keel, but they are not fully mature, so it remains to be demonstrated whether this feature truly characterizes the species.

An unusual feature of *Commelina milne-redheadii* is the large size of the pollen-bearing lobes on the staminodes (Fig. 4F). Although such lobes are present in most species of the genus, they typically are very tiny and are often inconspicuous. In *C. milne-redheadii* they would seem to be capable of producing a significant amount of pollen, but nothing is known about the pollen itself.

Commelina milne-redheadii is recorded mainly from moist places, e.g., in vlei and among marsh herbs. The notes on *Quarré 2717* are particularly informative. In contrasting this collection with *Quarré 2670* (*C. scaposa*), Quarré states that *2717* occurs in rather moist situations whereas *2670* usually grows in dry savanna. There is a single record of the new species from dry forest.

Paratypes. ANGOLA. **Benguela:** "Country of the Ganguellas and Ambuellas," *J. Gossweiler 2059* (K). **District unknown:** Nambali, *H. Baum 256* (BM, K); Luassenha, *J. Gossweiler 3531* (BM); Malange, Capunda, na reserva da Palance Preta Gigante, *C. Henriques 723* (K); Malange, *R. G. N. Young 781* (BM); Dala, valley of Chiumbe, *R. G. N. Young 1270* (BM); s. loc., *J. Gossweiler s.n.* (BM 71279 & BM 71280). DEMOCRATIC REPUBLIC OF THE CONGO. **Katanga:** Pastorale, Section 1, *P. Quarré 2717* (BR [3], US).

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Literature Cited

Faden, R. B. 1974. Commelinaceae. Pp. 653–667 *in* A. D. Q. Agnew, Upland Kenya Wild Flowers. Oxford University Press, New York.

———. 1991. The morphology and taxonomy of *Aneilema* R. Brown (Commelinaceae). Smithsonian Contrib. Bot. 76: 1–166.

———. 1994a. New species of *Commelina* (Commelinaceae) from the Flora of Tropical East Africa. Novon 4: 224–235.

———. 1994b. Commelinaceae. Pp. 303–309 *in* A. D. Q. Agnew & S. Agnew, Upland Kenya Wild Flowers, 2nd ed. East Africa Natural History Society, Nairobi.

———. 1995. Commelinaceae. Pp. 79–94 *in* M. Thulin (editor), Flora of Somalia, Vol. 4. Royal Botanical Gardens, Kew.

———. 2000. Floral biology of Commelinaceae. Pp. 309–317 *in* K. L. Wilson & D. A. Morrison (editors), Monocots: Systematics and Evolution. CSIRO Publishing, Collingwood, Victoria, Australia.

———. 2001. New or misunderstood species of *Commelina* (Commelinaceae) from the *Flora of Tropical East Africa* and *Flora Zambesiaca* areas. Novon 11: 398–409.

———. 2003. Lectotypification of two African species of *Commelina* (Commelinaceae), with the description of new taxa from Madagascar and Tanzania. Taxon 52: 831–836.

———. 2006. Commelinaceae. P. 585 *in* M. Thulin (editor), Flora of Somalia, Vol. 3, Appendix: Additions to Flora of Somalia, Vol. 1–4. Royal Botanic Gardens, Kew.

———. 2008. *Commelina mascarenica* (Commelinaceae): An overlooked Malagasy species in Africa. Adansonia, sér. 3 30: 47–55.

——— & M. H. Alford. 2001. A new species of *Commelina* (Commelinaceae) from Tanzania. Novon 11: 16–21.

IUCN. 2001. IUCN Red List Categories and Criteria, Version 3.1. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland, and Cambridge, United Kingdom.

Lewis, W. H. 1964. Meiotic chromosomes in African Commelinaceae. Sida 1: 274–293.

McNeil, J., F. R. Barrie, H. M. Burdet, V. Demoulin, D. L. Hawksworth, K. Marhold, D. H. Nicolson, J. Prado, P. C. Silva, J. E. Skog, J. H. Wiersema & N. J. Turland (editors). 2006. International Code of Botanical Nomenclature (Vienna Code). Regnum Veg. 146.

Obermeyer, A. A. & R. B. Faden. 1985. Commelinaceae. Pp. 23–60 *in* O. A. Leistner (editor), Flora of Southern Africa, Vol. 4, Pt. 2. Botanical Research Institute, Pretoria.

Perrier de la Bâthie, H. 1938. Commélinacées. Pp. 1–48 *in* H. Humbert (editor), Flore de Madagascar, 37e Famille. Imprimerie Officielle, Tananarive.

Polhill, D. 1988. Flora of Tropical East Africa: Index of Collecting Localities. Royal Botanic Gardens, Kew.